

PATENT SPECIFICATION

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(54) IMPROVEMENTS RELATING TO CIGARETTE FILTERS

(71) We, MOLINS LIMITED, a British Company, of 2, Evelyn Street, Deptford, London, SE8 5DH, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention is concerned with apparatus for making cigarette filters. It is particularly concerned with the manufacture of filters in which at least part of the smoke is filtered while passing substantially radially through a filter element.

Apparatus according to this invention comprises means for making a continuous smoke filtering rod and for continuously delivering the rod along a longitudinal path, a deforming device comprising at least one rotary member having upon it deforming surfaces which upon rotation of the member describe paths which intersect the path of the continuous rod and deform it at intervals along its length, and a device for cutting the rod at locations predetermined in relation to those at which it has been deformed.

A preferred apparatus according to this invention has a continuous smoke filtering tube maker which comprises means for continuously advancing longitudinally a plasticized tow of smoke filtering material, and means for accepting the tow and for forming it into a tube comprising a longitudinally extending mandrel around which the tow is passed to form a tubular rod which is shaped by the deforming device.

Examples of filters and of their manufacture according to this invention will be described with reference to the accompanying drawings. In these drawings:—

Figure 1 shows in longitudinal section a continuous filter rod to be cut up into short lengths for use with individual cigarettes;

Figure 2 is a diagrammatic view showing how the filter element is made, the view

being in the direction of the axis of the filter element;

Figure 3 is a view of one of the wheels forming the deforming means or die through which the filter element is extruded;

Figure 4 shows how one section of the continuous rod is assembled as part of a filter-tipped cigarette;

Figure 5 is a section on the line V—V in Figure 4;

Figure 6 is an enlarged view similar to Figure 4, but showing a different form of construction; and

Figure 7 is a section on the line VII—VII in Figure 6.

As shown in Figure 1, the continuous filter rod consists of a tubular filter element 2 which is extruded round a mandrel (not shown) to form a central bore 4. At intervals along the length of the filter element a plug 6 is injected into the bore of the filter element, for example pneumatically through the mandrel, while the filter element is being extruded. Further downstream the filter element is enclosed in a cylindrical paper wrapper 8.

As described further on, the peripheral surface of the filter element is formed with relieved parts separated axially from one another by land portions 10 at regular intervals. As shown in Figure 5, in the particular example shown, the relieved parts comprise twelve axially extending flutes 12. These form axial passageways between the filter element and the surrounding paper wrapper 8.

After the continuous filter rod shown in Figure 1 has been formed by the filter-making machine, it is cut at regular intervals at the lines 14 passing through the plugs 6. This results in a succession of double-length filters which are subsequently each joined between two cigarette lengths in the usual way. A cut through the middle of each double-length filter (i.e. as it were, along the lines 16 shown in Figure 1) then separates the assembly into two filter-tipped cigarettes

as shown in Figure 4. It should be noted in Figure 4 that the cigarette length 18 is joined to the filter by a piece of paper 20 which is wrapped and glued round the filter and overlaps onto the cigarette length. In Figure 4 the free end of the filter is the end including the land portion blocking the adjacent ends of the flutes, while the half-portion of the plug 6 is adjacent to the cigarette length, so that smoke enters the filter through the outer axial passages (i.e. through the flutes 12), passes substantially radially through the wall of the filter element, and finally leaves the filter through the bore, as shown by the arrows. As an alternative the filter could be joined to the cigarette length the other way round.

Figure 2 shows how the filter element is shaped by passing through a deforming means or die formed by four peripherally grooved wheels 22, only one of which is shown in full. Each wheel has a spindle 24 so that the wheel rotates about a fixed axis. The axes of rotation of the four wheels are all in the same plane. The peripheral surface of each wheel has two sets of circumferentially extending grooves defining, between them, circumferentially extending V-sectioned ribs which serve as deforming surfaces which intersect the path of the tube of filter material and deform it at regular intervals along its length to form the flutes 12. Between the two sets of ribs each wheel is cut away at two diametrically opposite positions 26 so as to leave the appropriate land portions 10 which are of circular cross-section. It will be appreciated that the four wheels are driven at the same speed so that their peripheral speeds all equal the speed at which the filter element material is passed through the die.

The filter element may, for example, be formed from cellulose acetate tow with sufficient plasticiser to ensure that the filter element material retains its shape after passing through the die.

Instead of the plugs 6 being injected into the bore of the filter element while the filter element is being extruded, they may be placed in position while each individual filter (or double-length filter) is being assembled with the cigarette length or lengths. For example, double-length filters may be carried on a fluted drum in the usual manner towards a position at which cigarette lengths are placed at opposite ends, and individual plug portions 6 (i.e. half the length shown in Figure 1) may be introduced into opposite ends of the double-length filter just before the cigarette lengths are brought into position against the filter.

Figures 6 and 7 show a different form of filter-tipped cigarette according to this invention. In this example the filter element is extruded continuously as before, but

instead of the wheels having ribs so as to form flutes in the surface of the filter element, the peripheral deforming surfaces on the wheels are so shaped that each filter element has a relieved part which is of circular external cross-section but with a smaller diameter than the land portions 30. Thus there is an annular space 32 between the main body of the filter element and the surrounding paper wrapper 34. The end of the filter element remote from the land portion 30 is held concentrically with the wrapper by a plug 36 which has axially extending ribs 38 as shown particularly in Figure 7. Smoke can pass between the ribs and into the annular space 32 and then radially through the filter element and into the bore 40 of the filter element. In order to assist in spacing the wrapper 34 from the surface of the filter element, the wrapper 34 may be formed with dimples 42 engaging the surface of the filter element, as shown in Figure 6. These dimples may be formed in the wrapper paper (which may in this case be relatively stiff) before the wrapper is wrapped round the filter element; for example, the dimples may be formed by a roller which rolls against the wrapper and has spikes to form depressions or pricks in the wrapper.

The filter in this example also includes a wad 44 of fibre glass or some other heat resistant material which is enclosed within the end of an outer paper wrapper 46. The composite filter assembly is then joined to a cigarette length 48 in this case by a narrow strip 50 which may be for example of aluminium. The wad 44 prevents the plug 36 from being damaged by the fire ball in the adjacent end of the cigarette if the cigarette is smoked all the way to the end. This may be desirable especially if the plug 36 is moulded from some plastics material. However, if the plug 36 is made of a material capable of withstanding the heat, the wad may be omitted.

The filter tipped cigarette shown in Figure 6 may be assembled in a manner described above in relation to the first example. Alternatively the assembly of the filter element and plug 36 (and also including possibly the wad 44) may be achieved in any of the ways described in British Patents Nos. 971,491 to 3.

Attention is directed to Specification (Serial No. 1360611) (Application No. 31802/70) from which the present application is divided.

WHAT WE CLAIM IS:—

1. Apparatus comprising means for making a continuous smoke filtering rod and for continuously delivering the rod along a longitudinal path, a deforming device comprising at least one rotary member having upon it deforming surfaces

which upon rotation of the member describe paths which intersect the path of the continuous rod and deform it at intervals along its length, and a device for cutting the rod at locations predetermined in relation to those at which it has been deformed.

2. Apparatus according to claim 1 wherein the deforming device comprises a plurality of such wheels driven at the same speed and timed relative to one another so that a projection on one wheel will meet a corresponding projection on another wheel whilst both projections are within the path of the continuous rod or tube.

3. Apparatus according to claim 1 or claim 2 wherein the periphery of the or each deforming wheel is provided with a plurality of transverse grooves, each groove lying between two of the circumferentially spaced projections.

4. Apparatus according to any of the preceding claims having a continuous smoke filtering tube maker which comprises means for continuously advancing longitudinally a plasticised tow of smoke filtering material, and means for accepting the tow and for forming it into a tube comprising a longitudinally extending mandrel around which the tow is passed to

form a tubular rod which is shaped by the deforming device.

5. Apparatus according to claim 4 including pneumatic means for injecting material through the mandrel and into the tubular rod at regular intervals timed relative to the deforming surfaces of the deforming device.

6. Apparatus for manufacturing tobacco smoke filter elements comprising a means for forming an inner member and a means for enclosing the said member in a tubular outer member which engages the inner member at a part of its peripheral surface, the means for forming the inner member being in accordance with any of the preceding claims.

7. Apparatus according to claim 1 substantially as described with reference to the accompanying drawings.

8. A smoke filtering rod or tube manufactured by apparatus according to any one of claims 1 to 7.

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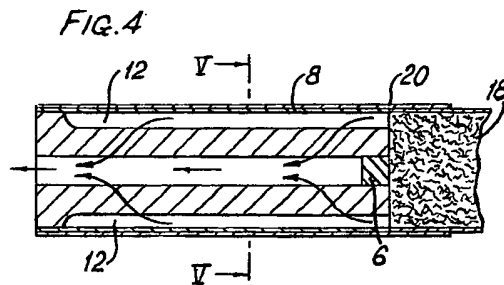
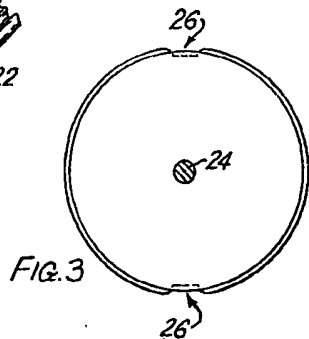
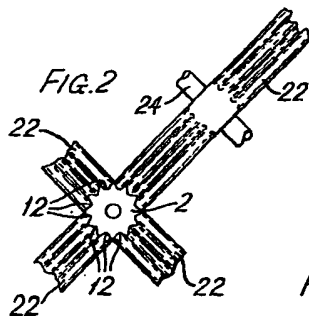
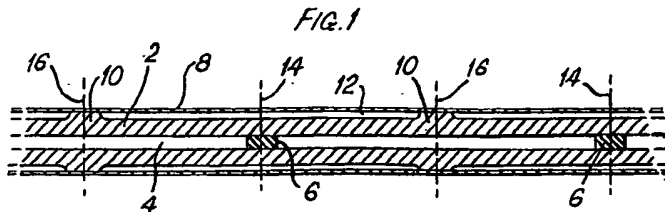


FIG. 6

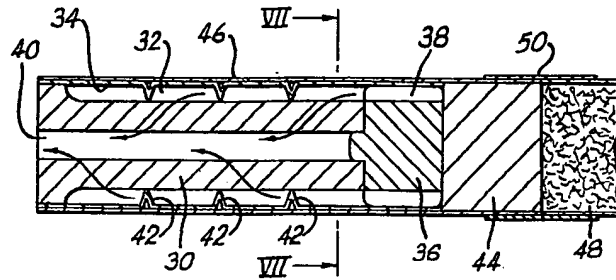


FIG. 7

